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Assessing Parental Anxiety in Pediatric Food Allergy: Development of the Worry About Food Allergy Questionnaire

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Abstract
Food allergies (FAs) in children are increasingly common, and strict allergen avoidance and safety concerns place parents at risk for anxiety (Lau et al. in Pediatr Allergy Immunol 25:236–242, 2014). Assessing parental anxiety with generic instruments may not capture the unique experience of parents managing children's FAs. This study developed and preliminarily validated the 13-item Worry About Food Allergy (WAFA) questionnaire, a measure of FA-specific parental anxiety, in an online sample of 265 parents aged 22–66 ($M = 40.25$) of children with FAs. The WAFA showed good internal reliability (Cronbach's $\alpha = .89$) and moderate convergent validity with other anxiety measures, indicating support for a reliable measure of a discrete, specific construct. Exploratory factor analysis indicated a single factor structure. Criterion validity was established through significant, small, positive correlations with relevant allergy variables. A coherent single factor measure, the WAFA, shows promise as a screening tool for parental anxiety in pediatric practice and FA management.

Keywords Parental anxiety · Pediatric food allergy · Assessment · Measure development

Recent prevalence rates for pediatric food allergy (FA) are estimated to be approximately 9% (Gupta et al., 2017), with 38.7% of children having a history of severe reactions (Gupta et al., 2011). Food allergy reactions can be life-threatening: In the US, every three minutes someone is sent to the emergency room due to a food allergy reaction (Clark, Espinola, Rudders, Banerji, & Camargo, 2011). The current management strategy for childhood food allergy is strict avoidance of the allergen, monitoring for cross contamination, carrying an epinephrine auto-injector, and yearly visits to the child's physician (Longo, Berti, Burks, Krauss, & Barbi, 2013). Although there is increasing focus on development of novel therapies such as allergen immunotherapy, which involves repeated exposure to increasing doses of the antigen (Burks, Laubach, & Jones, 2008), a recent analysis indicated risk for adverse reactions (Nurmatov et al., 2017), and long-term effects remain uncertain. As such, current practice in FA management generally remains focused on strict avoidance and preparation for a reaction.

While mortality in children with FA is relatively low, the burden on the child and the family system can be significant due to the high level of vigilance required for avoiding a food allergen and preparing for a potential reaction (Cummings, Knibb, King, & Lucas, 2010; King, Knibb, & Hourihane, 2009). Children with FA report greater separation anxiety than healthy siblings (King et al., 2009) and greater general anxiety about disease management compared to children with type 1 diabetes (Avery et al., 2003). Psychological distress impacts not only the child with the allergies, but also the parent and family system. Childhood FA creates a unique challenge for parents and physicians because children cannot manage their allergies on their own. Strict allergen avoidance and safety concerns place parents at risk for anxiety, with mothers of children with FA reporting significantly higher levels of stress and anxiety (Lau et al., 2014) and increased blood pressure (Walker et al., 2016) than mothers of children without FA. Therefore, clinicians must attend to parents' adjustment to children's food allergy diagnosis, as parents maintain responsibility for feeding and providing proper nutrition for their child (Polloni et al., 2013). The preventative nature of FA management, versus ongoing active medical treatment, may lead to symptoms of worry that are rarely visible to others, and the unpredictable and possible life-threatening nature of allergic reactions may contribute

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to daily anxiety and worry (Herbert, Shemesh, & Bender, 2016).

Parent management of FA also includes maintaining an appropriate balance of vigilance and anxiety, as some degree of vigilance is essential for effective allergy management (LeBovidge et al., 2006). Appropriate adjustment to a FA diagnosis requires establishing the "just right" level of anxiety: too little anxiety may decrease preparedness for an allergic reaction (Mandell et al., 2005), but too much anxiety may lead to over-restriction of developmentally appropriate social activities (Klinnert et al., 2015). In the event of a child experiencing anaphylaxis, parents may experience such distress over their child's vulnerability that it may lead to ongoing parental overprotectiveness even into the young adult years (Herbert & Dahlquist, 2008). As such, a primary task of medical and mental health providers is to help parents achieve a balance between vigilant management and participation in developmentally appropriate activities. As a first step, providers should assess for psychosocial concerns, including an assessment of parental anxiety (Herbert, Shemesh, & Bender, 2016).

Anxiety has been noted as a central aspect of decreased quality of life for parents of children with FA (Klinnert et al., 2015). However, assessment of anxiety in parents of children with FA has been constrained by use of general anxiety measures such as the Generalized Anxiety Disorder 7-Item Scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) or the State-Trait Anxiety Inventory (STAI; Spielberger, 1983), which have strong psychometric properties for the general population and have been used in the past with the FA population (e.g., Lau et al., 2014). There are some psychosocial measures that have been created or adapted for the FA population to assess the effects of children's food allergies on quality of life (e.g., Food Allergy Quality of Life Questionnaire [FAQLQ]; DunnGalvin, et al., 2017; DunnGalvin, Flokstra-de Blok, Burks, Dubois, & Hourihane, 2008; Knibb & Stalker, 2013), parents' emotional coping skills (e.g., Food Allergy Parent Questionnaire; LeBovidge et al., 2006), and parental burden (Food Allergy Quality of Life-Parent Burden [FAQL-PB], Cohen et al., 2004). Although these measures (e.g., FAQLQ, FAQL-PB) aim to address anxiety in some items, quality of life (QOL) measures are multi-factorial, as it is a complex construct that has different meanings to different individuals. To our knowledge, no measure has been developed to specifically assess FA-related anxiety as a single, independent construct. There has been a call for allergy-specific measures of parent anxiety in order to capture the unique experience of this population (Lieberman & Sicherer, 2011), as measures designed to assess clinically significant anxiety disorders in a general population may not capture the subtle and specific allergy-related worry that FA parents experience. Valid and specific assessment tools would enhance clinical practice of triaging families to receive greater psychosocial supports and referrals for intervention. The aim of this study was to develop and conduct preliminary validation of a newly-created measure of FA-specific parental anxiety to better assess parent worry about their child's food allergy and to collect qualitative feedback from participants to refine items for future validation.

Methods

Participants

Participants were 265 parents who self-identified as having a child diagnosed with a food allergy by a healthcare professional, who self-selected into the study to complete an online survey. Parents were recruited via social media (e.g., allergy-specific Facebook groups, Twitter) to complete the anonymous online survey. Participants were predominantly female, White, and highly educated. Parents reported the characteristics of their child's allergies, with most parents indicating multiple allergens. On average, parents indicated mild levels of generalized anxiety. Demographic characteristics of parents and children, allergy information, and anxiety scores are presented in Tables 1, 2, and 3.

Procedure

Measure Development

The WAFA development followed an iterative process. First, the theoretical framework and initial items were determined based on literature review and prior research on parent impact of food allergies, in response to a gap in FA-specific measures of anxiety used in current research. Second, the preliminary item content was discussed in an in-person meeting with a pediatric food allergy physician, who provided input on potential sources of worry for parents. Third, the preliminary items were reviewed by two parents of children with IgE-mediated food allergies and adapted according to their feedback. Fourth, the items were finalized for the present study to assess the psychometric properties, including convergent validity, criterion validity, and factor structure in this initial validation study.

Validation Study

Participants were recruited nationally via social media (e.g., Facebook, Twitter) to complete an online survey using Qualtrics, a secure online survey platform. The authors contacted social media accounts that focused on either parenting a child with food allergy, or general parenting support, to disseminate the survey with moderator permission. All

Table 1 Demographic characteristics of parent sample ($N = 265$)

Parent	*N*	*M*	*SD*	Missing	
				Count	(%)
Age	256	40.15	6.08	9	3.4
Parent	*n*	(%)	*SD*	Missing	
				Count	(%)
Gender	264	99.6	–	1	.4
Male	9	3.4	–	–	–
Female	255	96.2	–	–	–
Ethnicity*	264	99.6	–	1	.4
White	243	91.7	–	–	–
Black	5	1.9	–	–	–
Hispanic	8	3.0	–	–	–
American Indian/Alaska Native	3	1.1	–	–	–
Asian	12	4.5	–	–	–
Native Hawaiian/Other Pacific Islander	0	0	–	–	–
Other	3	1.1	–	–	–
Education Level	263	99.2	–	2	.8
High School or less	2	.8	–	–	–
Vocational School	3	1.1	–	–	–
Some College	26	9.8	–	–	–
College Degree	109	41.1	–	–	–
Professional/Post-graduate Degree	123	46.4	–	–	–
Child	*N*	*M*	*SD*	Missing	
				Count	(%)
Age	265	7.92	4.88	0	0
	n	(%)	*SD*	Missing	
				Count	(%)
Gender	265	100.0	–	0	0
Male	155	58.5	–	–	–
Female	108	40.8	–	–	–
Other	2	.8	–	–	–
Ethnicity*	264	99.6	–	1	.4
White	246	92.8	–	–	–
Black	10	3.8	–	–	–
Hispanic	16	6.0	–	–	–
American Indian/Alaska Native	3	1.1	–	–	–
Asian	17	6.4	–	–	–
Native Hawaiian/Pacific Islander	1	.4	–	–	–
Mixed race	30	11.3	–	–	–
Other	4	1.5	–	–	–

*Multiple responses possible

Table 2 Children's allergy characteristics ($N = 265$)

		N	*M*	*SD*	Missing	
					Count	(%)
Child age at diagnosis		263	1.76	2.04	2	.7
Allergy type*	*n*	(%)		*SD*	Missing	
					Count	(%)
					0	0
Milk	83	31.3			–	–
Eggs	97	36.6			–	–
Fish	14	5.3			–	–
Shellfish	21	7.9			–	–
Tree nuts	152	57.4			–	–
Peanuts	171	64.5			–	–
Wheat	28	10.6			–	–
Soybean	25	9.4			–	–
Sesame	61	23.0			–	–
Other	65	24.45			–	–
Allergy severity	*n*	*M*		*SD*	Missing	
					Count	(%)
Number of allergens (range 1–11)	264	3.06		2.21	1	.3
Number of symptoms (range 0–21)	265	7.17		4.36	–	–
Number of allergic reactions in past 6 months (range 0–10)	260	1.03		1.53	5	1.9
Lifetime emergency room visits (range 0–13)	264	1.36		2.06	1	.3
Lifetime hospitalizations (range 0–9)	264	.28		.96	1	.3
Lifetime SIE use (range 0–15)	263	.86		1.88	2	.7
Lifetime anaphylactic reactions (range 0–10)	264	.62		1.36	1	.3

SIE Self-injectable epinephrine

*Multiple responses possible

Table 3 Parent anxiety descriptives ($N = 265$)

Anxiety measures	*n*	*M*	*SD*	Range	Missing	
					Count	(%)
GAD-7	250	6.57	5.46	0–21	15	5.7
PECI-guilt and worry subscale	244	17.59	8.04	0–40	21	7.9
WAFA	236	13.25	7.45	0–35	29	10.9

GAD-7 Generalized Anxiety Disorder, *PECI* Parent Experience of Childhood Illness, *WAFA* Worry about Food Allergy

recruitment methods and survey materials were approved by the Eastern Michigan University human subjects review committee.

Parents were able to access the survey from any electronic device. Those who clicked on the survey link were directed to an informed consent page and agreed prior to completing other survey items. To participate in the study, parents first were asked to report on demographic information about their child and themselves (e.g., age, sex, race/ethnicity, education) and information about their child's food allergy (e.g., allergens, symptoms, previous reactions). Next, parents completed measures of anxiety, including the WAFA items. Participation in the survey was estimated to last 10–20 min. No incentive or reward was offered due to the brief nature of the questionnaire.

Qualitative Feedback

At the conclusion of the survey, open-ended qualitative feedback was requested from parents about how they might modify the preliminary set of WAFA items that were presented. Specifically, the items were displayed again and parents were asked to write in any feedback or changes in wording and provide suggestions for additional items or the removal of items, including their reasoning for those suggestions. A child-report version was also presented for qualitative feedback from parent participants, again asking for feedback on wording and addition or removal of items.

Measures

All parents reported demographic and food allergy information and completed the following measures of psychological functioning.

Generalized Anxiety Disorder 7-Item Scale (GAD-7; Spitzer et al., 2006)

The GAD-7 is a 7-item scale intended to screen for generalized anxiety symptoms in primary care settings and the general population (Löwe et al., 2008). Participants respond on a 4-point Likert scale with a total score range of 0–21. Items include prompts such as "Over the last 2 weeks, how often have you been bothered by the following problems? … feeling nervous, anxious, or on edge." The GAD-7 has demonstrated excellent internal consistency (Cronbach's $\alpha = 0.92$) and good test–retest reliability (intraclass correlation $r = 0.83$).

Parent Experience of Childhood Illness Scale (PECI; Bonner et al., 2006)

The PECI is a 25-item measure that assesses parental adjustment to a child's chronic illness. For this study, only the Worry and Guilt subscale was used, which includes 10 items (one item was dropped from the original subscale due to cross-loading that fit better on another subscale). This subscale includes items like, "I worry that my child's illness will worsen/return." Participants responded on a 5-point Likert scale with a possible range of 0–40. This subscale has good internal consistency (Cronbach's $\alpha = 0.89$) and validity as indicated by positive associations with other measures of anxiety and internalized subjective burden. We sought to use a measure of parent worry that was more specific than the GAD-7 (i.e., specific to the medical setting), but not illness-specific.

Worry About Food Allergy Questionnaire (WAFA)

This measure was developed by the researchers and contains 13 items to measure parental anxiety specific to caring for their child with food allergy. The measure asks parents to rate the frequency of their thoughts and feelings about their child's food allergy in the past 6 months on a 4-point Likert Scale from 0 = *Never* to 3 = *Always* (range 0–39) in which higher scores reflect greater anxiety. Sample items include, "How often did you become nervous or worried about your child having a food allergy reaction and not having their allergy medicine available (like an epipen®)?" or "How often did you become nervous or worried about your child feeling different from other kids because of their food allergy?"

Data Analysis

Data analysis was conducted using R (version 1.1.463; RStudio Team, 2015) and involved multiple steps. First, data were reviewed for completeness and missing data patterns were explored. All cases with completed demographic and allergy information were included in the analysis. Cases with less than 20% complete data (e.g., only parental demographic data) were removed. Additionally, two cases were removed due to outliers in child age (i.e., parents of adult children). Missing data on the remaining data set of 265 participants were explored using Little's MCAR test (BaylerEdPsych package; Beaujean, 2012) and exploration of correlations between measured variables and missingness. Little's MCAR was non-significant ($p = 0.20$) and no significant correlations between demographic and allergy information and missingness were found, indicating that data were missing completely at random. Percentage of missingness across variables was low (see Tables 1, 2, and 3). Maximum Likelihood estimation was used in all subsequent analyses to account for missing data by developing a variance–covariance matrix using the "JWileymisc" (Wiley, 2018) and "mvnmle" (Gross & Bates, 2018) packages. The matrix was used as the basis for further analyses.

In the next step, the 13-item WAFA was submitted to an exploratory factor analysis to determine a viable factor structure. Only items with factor loadings of 0.4 or higher and no cross loadings of 0.3 or higher were retained. The optimal number of factors to retain was based on Eigenvalues (> 1), examination of the screeplot, and factor loadings. After determination of the factor structure, psychometric properties including internal consistency reliability (Cronbach's alpha) and convergent and criterion validity (Pearson correlations) were calculated using the "psych" package.

Qualitative Analysis

Qualitative responses were organized in a tabular form and independently reviewed by four members of the study team for emerging themes (e.g., multiple parent participants sharing the same or similar feedback). Content themes were discussed during a study team meeting and a consensus was reached for feedback that was consistent across participants to warrant changes to the questionnaire.

Results

Exploratory Factor Analysis

The 13-item WAFA was submitted to an Exploratory Factor Analysis by using data from 241 parents. The Kaiser-Mayer-Olkin (KMO; Cerny & Kaiser, 1977; Kaiser, 1974) test showed adequate sampling (0.83), and the Bartlett's test of sphericity (Snedecor & Cochran, 1989; $p < .01$) showed that our data were suited for an EFA.

We used the minimum residual (minres) solution for exploration of factors (Harman & Jones, 1966). Because we assumed our factors to be intercorrelated, we employed an oblique method of rotation (oblimin). We explored a 1- and 2-factor solution for the WAFA. The 2-factor structure resulted in several cross loaded items (item #s 5, 10. 13). The screeplot was indicative of a 1-factor structure and all items loaded at 0.46 or higher on the 1-factor solution, consistent with our predetermined criteria. As such, we retained the

Table 5 Pearson correlations between WAFA total score and related anxiety and allergy variables

Variables	WAFA
GAD-7	0.55**
PECI-guilt and worry subscale	0.72**
Number of allergens	0.15*
Number of symptoms	0.26**
Allergy reactions in past 6 months	0.20**
Lifetime ER visits	0.22**
Lifetime hospitalizations	0.22**
Lifetime SIE use	0.18**
Lifetime anaphylactic shock	0.23**

All correlations indicate greater worry associated with greater allergy severity

GAD-7 Generalized Anxiety Disorder 7-Item Scale, *PECI* Parent Experience of Childhood Illness, *WAFA* Worry about Food Allergy, *SIE* Self-injectable epinephrine

*$p < .05$, **$p < .01$

Table 4 Items and factor loadings

Items	Factor 1
1. How often did you become nervous or worried about your child having a food allergy reaction when it wasn't expected or they didn't see it coming?	0.68
2. How often did you become nervous or worried about your child having a food allergy reaction and not having their allergy medicine available (like an epipen®)?	0.55
3. How often did you become nervous or worried about your child dying because of a food allergy reaction?	0.70
4. How often did you become nervous or worried about your child having food allergy reactions (like hives or vomiting) in front of their friends?	0.62
5. How often did you become nervous or worried about the side effects of your child's food allergy medicine?	0.54
6. How often did you become nervous or worried about your child missing school because of their food allergy?	0.46
7. How often did you become nervous or worried about missing social activities (your child's, or the family's) because of your child's food allergy?	0.60
8. How often did you become nervous or worried about your child feeling different from other kids because of their food allergy?	0.62
9. How often did you become nervous or worried about your child being alone when they have a food allergy reaction?	0.65
10. How often did you become nervous or worried about your child making safe food choices without your help (e.g., if they were with friends or at school and you weren't there)?	0.56
11. How often did you become nervous or worried about your child becoming allergic to more or new foods?	0.66
12. How often did you become nervous or worried about your child's food allergy symptoms getting worse?	0.78
13. How often did you become nervous or worried about your child explaining food allergy to other people without your help?	0.62

1-factor solution accounting for 40% of the total variance. All items were retained and are presented together with standardized factor loadings in Table 4.

Internal Consistency

Internal consistency reliability for the entire scale using Cronbach's alpha was good ($\alpha = 0.89$). Internal reliabilities for the GAD-7 and the Guilt and Worry Subscale of the PECI in our sample were also high, with Cronbach's alpha values of 0.92 and 0.89, respectively. All items were retained for subsequent analyses since internal reliability did not improve with removal of any items.

Validity

Convergent validity was evaluated by correlating the WAFA with GAD-7 and the PECI-Guilt and Worry scale. The WAFA showed statistically significant moderate positive correlations with the GAD-7, a measure of general anxiety ($p < .01$), and even higher positive correlations with the Guilt and Worry subscale of the PECI, a measure of parental anxiety related to parenting a child with a medical illness ($p < .01$). Additionally, criterion validity was established through statistically significant, small positive correlations with number of allergies ($p < .05$) and total symptoms experienced ($p < .01$), and several items indicating reaction severity, including number of allergy reactions in the past 6 months, lifetime ER visits, lifetime hospitalizations, lifetime emergency epinephrine use, and lifetime anaphylactic shock reactions (all $p < .01$), all in anticipated directions (i.e., greater anxiety with more severe allergy characteristics). See Table 5 for all correlation coefficients between the WAFA and anxiety measures and allergy variables.

Qualitative Data

Of the 265 parent participants, 108 provided qualitative feedback on wording of items and whether there were items they would add or omit, as well as qualitative feedback on a proposed child-report version that mirrored the parent WAFA using first-person language for a child with FA. Overarching themes within the qualitative data included three suggestions for a future revision of the WAFA: (1) Clarify wording of item 1 ("How often did you become nervous or worried about your child having a food allergy reaction when it wasn't expected or they didn't see it coming?"), as many parents reported that they consider all reactions to be unexpected; (2) To consider different versions based on child developmental age, as some items pertaining to school and social settings were not yet relevant for their infant or toddler; and (3) To consider removing the item about dying from the child-report version.

Discussion

As the prevalence of childhood food allergy continues to increase (Gupta et al., 2017), and with no established cure, there is a growing population of parents of children with FA who must remain vigilant in managing their child's allergy risks. Parents of children with FA report anxiety, sometimes elevated to the point of adversely impacting family QOL (Klinnert et al., 2015). Therefore, clinicians in interdisciplinary allergy clinics need tools to screen for heightened anxiety to identify whom to refer for psychosocial support to best address whether parental anxiety may be adversely impacting the family's quality of life. The present study developed and preliminarily validated a brief measure that assessed parent worries specific to managing their child's FA, resulting in a 13-item, internally consistent tool to assess allergy-specific anxiety in parents. Our WAFA questionnaire was developed, with parent and physician input, to allow for more specific assessment of the worries parents may experience as they manage FA, in contrast to generalized measures assessing clinical symptoms. For example, a brief measure of generalized anxiety disorder symptoms, the GAD-7, is widely available and used often for a rapid screen of anxiety, but it is very broad in its content (e.g., asks about "feeling nervous" without concrete anchors for context or specific situations). The WAFA was only moderately correlated with the GAD-7 scores in our sample, which supports our aim to establish a measure that captures some unique content specific to allergy, which may not be captured by general measures. If the association were higher, it would indicate greater shared measurement variance, which would suggest our new measure has less unique value. Thus, the moderate correlation coefficient indicated support for our aim to develop a more specific measure of parent anxiety that is uniquely contextualized in worries about FA.

General tools have been used to assess parent anxiety in FA research (e.g., Lau et al., 2014), but these broad anxiety measures (e.g., STAI, GAD-7) are intended to capture clinically significant, diagnosable anxiety disorders in the general population, with a threshold that many FA parents may not exceed. Moreover, it is important to note that FA parents should exhibit vigilance, and perhaps at least *some* anxiety, as it serves a protective purpose if it helps them keep their children safe (Mandell et al., 2005). Klinnert et al. (2015) emphasized the importance of families finding the right balance between appropriate allergy management and excessive distress. Most general clinical assessment measures are written to be sensitive to elevated pathology but not with a measure floor that could capture, on a continuous scale, the potential for anxiety that is "too low." The WAFA may present a feasible first step toward developing more clinically specific and sensitive measures. That is, once

the measure is validated in a clinical sample, it may serve to capture not only parents with elevated anxiety, but also parents with relatively little worry. If a future clinical validation study establishes an association between low WAFA scores and clinical characteristics that suggest poor allergy management, the WAFA may demonstrate clinical utility as a screener for poor adherence to an allergy management plan. As FA healthcare providers are calling for integrated behavioral health services in allergy clinics (Oland, Booster, & Bender, 2018), there is a concomitant increasing call for allergy-specific measures (Birdi, Cooke, & Knibb, 2016; Lieberman & Sicherer, 2011) to improve detection of relevant targets for treatment.

Our study is the first to our knowledge to measure food allergy-specific worry in a sample of parents who self-identified as having children with IgE-mediated FA. The preliminary version of the WAFA demonstrated good psychometric properties, as the items were all consistent with one another, and the overall measure score was associated with a measure of parent worry specific to having a child with a medical condition. Moreover, the WAFA was related to allergy characteristics that would support its criterion validity, as it correlated with likely indicators of allergy reaction severity, which would presumably be associated with more worry in parents. Based on its preliminary psychometrics in this study, the WAFA could be a useful adjunct to measures of child and family QOL, which are typically longer and multidimensional (Dunn Galvin et al., 2008; DunnGalvin et al, 2017), and could serve as a sensitive outcome measure for psychological intervention studies (Knibb, 2015; LeBovidge et al., 2008).

This preliminary study did have several limitations that should be addressed in subsequent research to validate the measure. We utilized an online survey methodology, and therefore, our sample was self-selected and highly biased. Generalizability is constrained by our predominantly white, educated sample. Additionally, the online methodology prevented physician verification of allergy or of any other medical data. Finally, our methods for attempting to measure a construct of allergy severity were limited, as this has been difficult to operationalize consistently and meaningfully in food allergy research.

Further research is underway in a clinical setting to validate a revised version of the measure, integrating the feedback we received in this preliminary study. In addition to clarifying item content, we have revised the WAFA[1] to include three separate, developmentally-specific versions of the parent report, per parent feedback. Specifically, the updated parent-report WAFA now has a preschool version (parents of children ages 0–5), a child version (parents of children ages 6–11), and a teen version (parents of children ages 12–17). Future research should conduct confirmatory factor analysis on the revised measure to confirm its structure and to further establish its psychometrics. Future validation studies with a larger, more diverse, clinical sample may yield a study sample with more racial/ethnic and socioeconomic diversity to increase generalizability of findings. Future studies also would benefit from clinical samples that are more diverse with respect to allergy characteristics and subtypes.

This study provides a novel contribution to the FA literature, as we have developed a brief, specific measure of allergy-specific anxiety with solid psychometric properties, which captured distress not captured by general measures. Once validated clinically, the WAFA could be used in the future to inform focused psychosocial intervention with families who are overly anxious, those not vigilant enough and thus nonadherent, or those who report low QOL due to their child's food allergy. As FA prevalence increases, the need for integrated psychosocial services will also increase, and the research methodology and tools must be established for optimal clinical care.

Compliance with Ethical Standards

Conflict of interest Stefanie Poehacker, Alix McLaughlin, Tori Humiston, and Catherine Peterson declare that they have no conflicts of interest.

Human and Animal Rights All recruitment methods and survey materials were approved by the Eastern Michigan University human subjects review committee.

Informed Consent The authors certify that all research procedures were conducted in accordance with ethical principles for human subjects research.

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[1] Please contact the senior author, Catherine Peterson, PhD, at cpeter39@emich.edu for updated versions of the measure for clinical or research purposes.

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